

## CLAIMS

1. A gas sensor comprising:  
an optical source for emitting radiation therefrom;  
5 a detector sensitive to radiation emitted from the source;  
a circumferential chamber, having optically reflective surfaces,  
extending between the source and the detector.
2. The gas sensor of claim 1 in which the chamber is defined by outer  
10 and inner circumferential walls of a substantially cylindrical housing.
3. The gas sensor of claim 2 further including a first end wall, extending  
radially between the outer and inner circumferential walls to define a first end  
of the chamber.  
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4. The gas sensor of claim 3 further including a second end wall,  
extending generally radially between the outer and inner circumferential  
walls and at an oblique angle to a tangent of the outer or inner circumferential  
walls, to reflect light through a gap in the inner circumferential wall into a  
20 central chamber, the optical pathway between source and detector thereby  
comprising a substantially circumferential portion and a radial portion.
5. The gas sensor of claim 4 in which the central chamber is defined by  
the internal surface of the inner circumferential wall.
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6. The gas sensor of claim 3 in which the source is located adjacent said  
first end wall.
7. The gas sensor of claim 3 in which the detector is located adjacent said  
30 first end wall.

8. The gas sensor of claim 4 or claim 5 in which the detector is located within the central chamber.
9. The gas sensor of claim 4 or claim 5 in which the source is located within the central chamber.
10. The gas sensor of claim 2 further comprising a chamber cover, forming a closure for the cylindrical housing, the chamber cover including a reflective inner surface in combination with a gas permeable member.
11. The gas sensor of claim 10 in which the gas permeable member comprises a flame arresting material.
12. The gas sensor of claim 10 or claim 11 in which the gas permeable member covers an annular portion of the circumferential chamber.
13. The gas sensor of claim 12 in which the gas permeable member comprises a disc of radius greater than said inner circumferential wall and less than said outer circumferential wall.
14. The gas sensor of claim 4 in which the detector is located within the central chamber and comprises two detector elements spaced apart along an axis substantially parallel to the central axis of the circumferential walls.
15. A gas sensor comprising:  
an optical source for emitting radiation therefrom;  
a detector sensitive to radiation emitted from the source;  
a chamber, extending between the source and the detector, defined by a plurality of non-focussing, planar surfaces disposed to form a folded optical pathway that includes a plurality of segments substantially parallel to one another.

16. The gas sensor of claim 15 further comprising a chamber cover, forming a top closure for the chamber, including a reflective inner surface in combination with a gas permeable member.

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17. The gas sensor of claim 16 in which the gas permeable member comprises a flame arresting material.

18. A method of forming a gas sensor comprising the steps of providing  
10 an optical source for emitting radiation therefrom and a detector sensitive to radiation emitted from the source at opposite ends of a circumferential chamber extending around the periphery of a sensor housing and having optically reflective surfaces along the length thereof.

15 19. A gas sensor substantially as described herein with reference to the accompanying drawings.